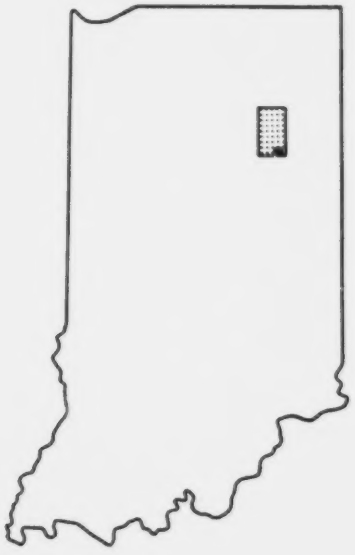
FEMA 209 : 180095
ORIGINAL

# FLOOD INSURANCE STUDY

COMPLETED
32

## TOWN OF WARREN, INDIANA
HUNTINGTON COUNTY



MARCH 30, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 180095

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
TOWN OF WARREN, HUNTINGTON COUNTY, INDIANA

# 1.0 INTRODUCTION

## 1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Warren, Huntington County, Indiana, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Diaster Protection Act of 1973. This study will be used to convert the Town of Warren to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.1(d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

## 1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Diaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Gannett, Fleming, Corddry and Carpenter, Inc., for the Federal Emergency Management Agency, under Contract No. H-4804. This study was completed in March 1981.

## 1.3 Coordination

Upon the initiation of the study, a legal notice was placed for 3 consecutive weeks in the Warren Tribune beginning on August 31, 1979, to notify all interested persons to submit any relevant facts and technical data concerning local flood hazards. Streams requiring detailed study were identified at a meeting attended by representatives of the study contractor, the FEMA, the Indiana Department of Natural Resources (IDNR) and representatives of the Town of Warren in May 1978. Results of the hydrologic and hydraulic analyses were coordinated and close contact was maintained with IDNR during the course of the study. The U. S. Geological Survey (USGS) office in Indianapolis was contacted and provided recorded flood data and other relevant information. The U. S. Department of

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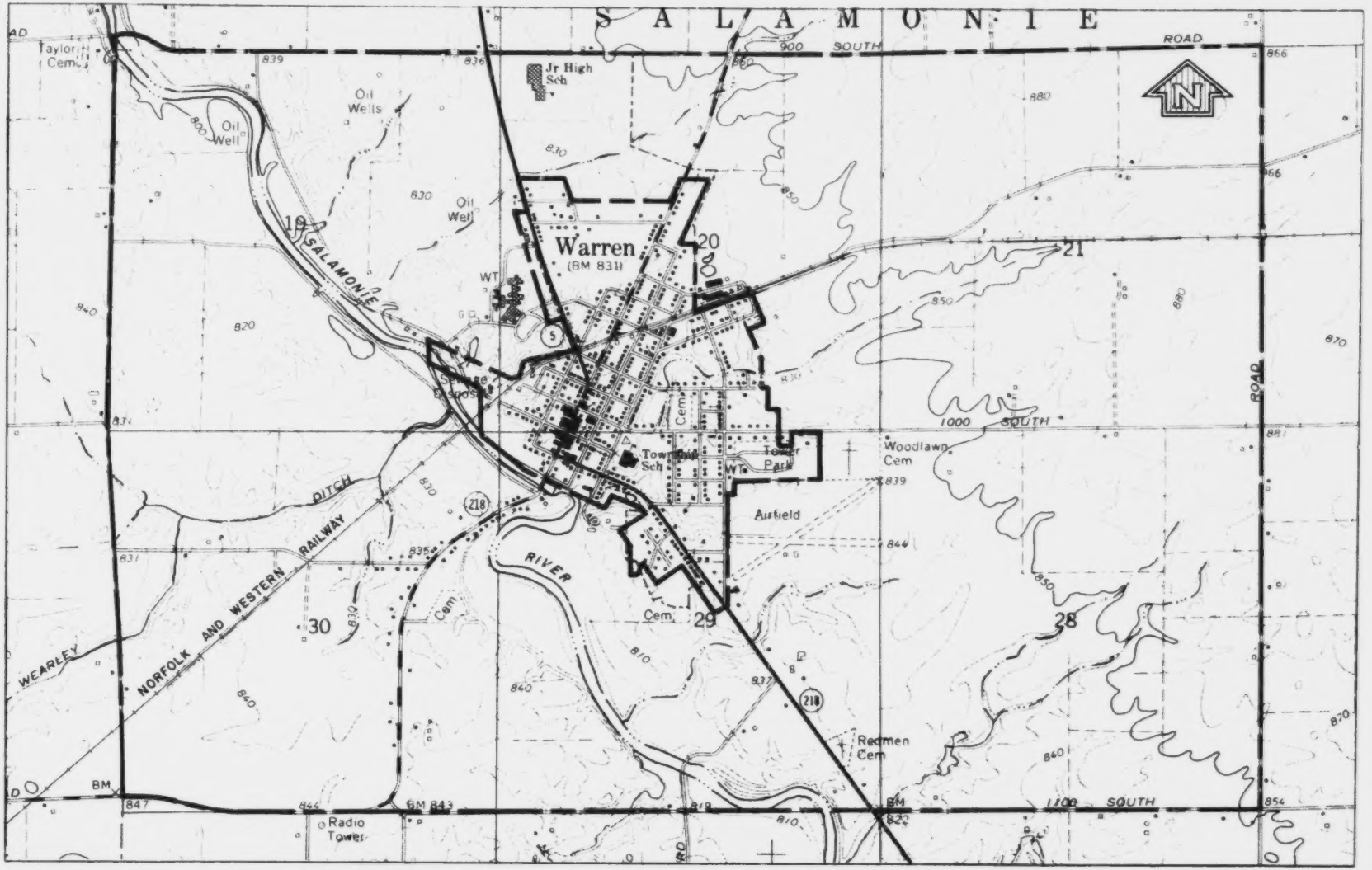


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

## TOWN OF WARREN, IN

(HUNTINGTON CO.)

APPROXIMATE SCALE

2,000' 0 2,000' 4,000' 6,000'

## VICINITY MAP

Agriculture, Soil Conservation Service was contacted and provided information used in the Hydrologic Analysis.

On October 15, 1981, the results of the study were reviewed at the final meeting attended by representatives of the study contractor, FEMA, IDNR, and community officials. The study was acceptable to the community.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This Flood Insurance Study covers the incorporated area and the surrounding extraterritorial area of the Town of Warren, Huntington, Indiana. The area of study is shown on the Vicinity Map (Figure 1).

The limits of detailed study in the Town of Warren was determined by FEMA with community, study contractor and IDNR consultation at the meeting in May 1978.

Potential flooding caused by overflow of the Salamonie River, from 900 South Road at the downstream extraterritorial jurisdiction limit of the Town of Warren to the upstream extraterritorial limits of the Town of Warren, was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through March 1986.

Approximate methods of study were used to identify the floodplains of small tributaries within the Town of Warren. Approximate study methods were used to study those areas having low development potential and/or a minimal flood hazard. In instances where approximate study streams have floodplains which are smaller than the minimum criteria established by FIA, no flood hazard areas were identified.

### 2.2 Community Description

The Town of Warren is located in the northeastern portion of Indiana in southeastern Huntington County surrounded by unincorporated areas of Huntington County. The total land area contained within the Town of Warren corporate limits is approximately 0.53 square mile. The community has extraterritorial jurisdiction extending north to south from 900 South Road to 1100 South Road and east to west from 300 East Road to Meridian Road. The land area included in the corporate limits and extraterritorial jurisdiction is 6.0 square miles. The Town of Warren is located 14 miles west of Bluffton, 34 miles north of Muncie and 30 miles south southwest of Fort Wayne, Indiana. According to U. S. Census Bureau figures, the population has decreased from 1,241 in 1960 to 1,229 in 1970 (Reference 1).

The Town of Warren is located in the Upper Wabash River Basin in northeastern Indiana. This Basin is one of the 18 watersheds established in 1956 by the Indiana Water Resources Study Committee and it includes roughly 3,779 square miles primarily in northeastern Indiana and 285 square miles in northwestern Ohio. The land surface of the Upper Wabash River Basin is a result of glaciation of the Wisconsin Age and consists of ground moraine and end moraines. The surface of Warren and the Salamonie River Basin are primarily ground moraine consisting of glacial till. The Salamonie River Basin, which contributes to Upper Wabash River Basin, is of oblong shape with its axis running northwest to southeast. The Salamonie River Basin is bounded to the northeast by the Salamonie Moraine and to the southwest by the Mississinewa Moraine.

The Upper Wabash River Basin, including the Salamonie River Basin, is in the physiographic region known as the Tipton Till plain. This region includes most of the central part of the State of Indiana, extending from Ohio to Illinois and roughly bounded north and south by 41° to 39.5° latitude (Reference 2). The cumulative thickness of unconsolidated sand and gravel above bedrock at the Town of Warren varies from 0 to 20 feet. The bedrock which underlies the area consists primarily of limestone and dolomite of the Silurian Age, at a basement elevation of about 800 feet NGVD (Reference 3).

The Salamonie River flows northwest through the central section of the extraterritorial limits of the Town of Warren and empties into the Wabash River near Largo in Wabash County. The Salamonie River extends from Salamonia near the Indiana-Ohio state boundary, northwest through Portland, Montpelier and Warren to the Wabash River. The river falls about 350 feet in this distance and has a drainage area of 560 square miles at its mouth (Reference 4).

The topography of the area is nearly flat to gently rolling, and has gentle land slopes except near the Salamonie River, where entrenchment of the river valley has occurred. The Town of Warren is located adjacent to the Salamonie River Valley and has a range in local elevation from about 795 feet NGVD in the northern section of the town, to over 890 feet NGVD in the northeastern part of town. Approximately 70 percent of the land within the corporate limits of the town has been developed, with the remainder of the extraterritorial land being vacant, wooded or agricultural. Within the flood plains studied, development is limited, consisting of single family residences. Where development has occurred it is distributed uniformly throughout the corporate limits. State Route 5, State Route 218 and the Norfolk and Western Railway serve the residents of the Town of Warren.

The climate of this region is characterized by moderately warm summers with temperatures occasionally rising above 85 degrees, and cool winters with temperatures dropping below 20 degrees. The annual precipitation over the watershed averages 39 inches including runoff from 20 inches of snowfall. A major portion of the total precipitation occurs in the spring and summer of the year (Reference 5).

## 2.3 Principal Flood Problems

The past history of flooding within the Town of Warren indicates that flooding may occur during any season of the year, but the majority of major floods have occurred in the spring, resulting from heavy rains sometimes combined with snowmelt and ice jams. A review of the records of the stream flow gages maintained by the U. S. Geological Survey on the Salamonie River at Dora (gage number 33245) and Warren (gage number 33243) indicates that major floods have been experienced on the Salamonie River, during March 1913, May 1927, January 1930, February 1936, May 1943, January 1950, April and June 1957, June 1958, February and April 1959, and December 1966 (Reference 6). The worst flood to be recorded occurred on March 26, 1913 and this storm event produced record floods throughout the Midwest. Another major flood affecting Warren was the flood of February 10, 1959, which produced the highest stage recorded at Warren gage since 1924.

The flooding which occurred in June 1958 was reported to be within 3 feet of the low steel of the Wayne Street Bridge and the 1959 flood was reported by local residents to be "lapping at the girders." The estimated discharge of the 1959 flood was 13,200 cfs and this corresponds to about a 30-year recurrence interval flood, based upon the discharge frequency relationship of the Warren gage. The second highest stage to be recorded since 1958 at the Warren gage occurred on March 6, 1963, however this was associated with an ice jam and not general flooding conditions along the river.

The newspaper articles below recount flooding at Warren.

HUNTINGTON HERALD-PRESS

March 26, 1913

*SALAMONIE BRIDGE*
*AT WARREN CARRIED*
*AWAY BY TORRENTS*

*The Salamonie river bridge in the town of Warren gave way to the flood Wednesday morning and half of it was swept away. Warning was given of the calamity several hours before the structure gave way and everything possible was done to save it. The property loss will be very heavy.*

*FLOOD AT WARREN*

*The Salamonie river went on a rampage Tuesday with the other streams of the county and did an enormous*



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March 26, 1913

*damage in Warren. The M. B. & E. Traction Co. was perhaps the heaviest loser in that vicinity, as about half a mile of the track south of the river was swept away.*

*Pinkle Bros. mill was flooded and the structure, although it has stood many floods, threatened to part company with its foundation and float away. A new dynamo had recently been installed and it is thought it is in bad shape.*

*The city electric lighting plant was put out of commission by four feet of water backing into its boiler room. As the lighting plant's help the M. B. & E current was missing. Warren was in darkness Tuesday evening.*

January 14, 1930

*STREAMS STILL LACK SEVERAL FEET OF REACHING 1913 RECORD*

*Rising levels in the Little Wabash and Salamonie rivers and minor Huntington county streams resulted in the closing of several roads Tuesday, and there was a possibility that part of the main Markle street adjoining the Wabash river might be flooded.*

*The Salamonie river at Warren had reached almost to the Merritt Tam residence but the level was said to be at least four feet below the 1913 flood stage mark.*

THE WARREN TRIBUNE

June 13, 1958

*SALAMONIE RIVER OVERFLOWS AFTER EIGHT INCHES DELUGE*
*SALAMONIE LEAVES BANKS IN WORST FLOOD SINCE 1913*

*"The Salamonie River surged out of its banks in the worst flood since*



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THE WARREN TRIBUNE

June 13, 1958

*1913 this week after nearly eight inches of rain hit the Salamonie Valley between Sunday morning and Tuesday evening. ...*

*"At its crest the flood came within three feet of the bridge floor on South Wayne Street in Warren."*

February 13, 1959

*SALAMONIE RIVER OVERFLOWS BANKS*

*"Local families evacuated Tuesday." "Temperatures in the high 40's Monday night and early Tuesday morning accompanied by more than three inches of rain left streets and sidewalks nearly free of ice Tuesday, but the heavy rain sent the Salamonie River roaring out of its banks Tuesday morning forcing several families to evacuate their homes. ....*

*"The Salamonie reached a flood stage equal to the June, 1958, stage at about 2:00 p.m. Tuesday."*

No damage estimates from past floods were available for the Town of Warren. The February 1959 flood and estimated 100-year and 500-year flood levels for the Salamonie River are presented in Figures 2 and 3.

## 2.4 Flood Protection Measures

There are no known structural flood protection devices affecting the Salamonie River at the Town of Warren. A flood control dam is located at mile 3.1 on the Salamonie River which forms the Salamonie Lake. This dam, which was completed in September 1966, controls 553 square miles of drainage area and provides 250,500 acre-feet for temporary flood flow retention (Reference 7). However, since the dam is located downstream of the Town of Warren, it provides no protection from flooding in the Town of Warren.

Non-structural measures of flood protection are also being utilized to aid in the prevention of future flood damage. These are in the form of land use regulations adopted from the code of Federal Regulations which controls building within areas that have a high risk of flooding (Reference 8).



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Figure 2. View of the downstream west abutment of the Norfolk and Western Railway bridge over the Salamonie River. The 1959 flood level and the estimated 100-year and 500-year flood levels are indicated (photo date, June 1979).

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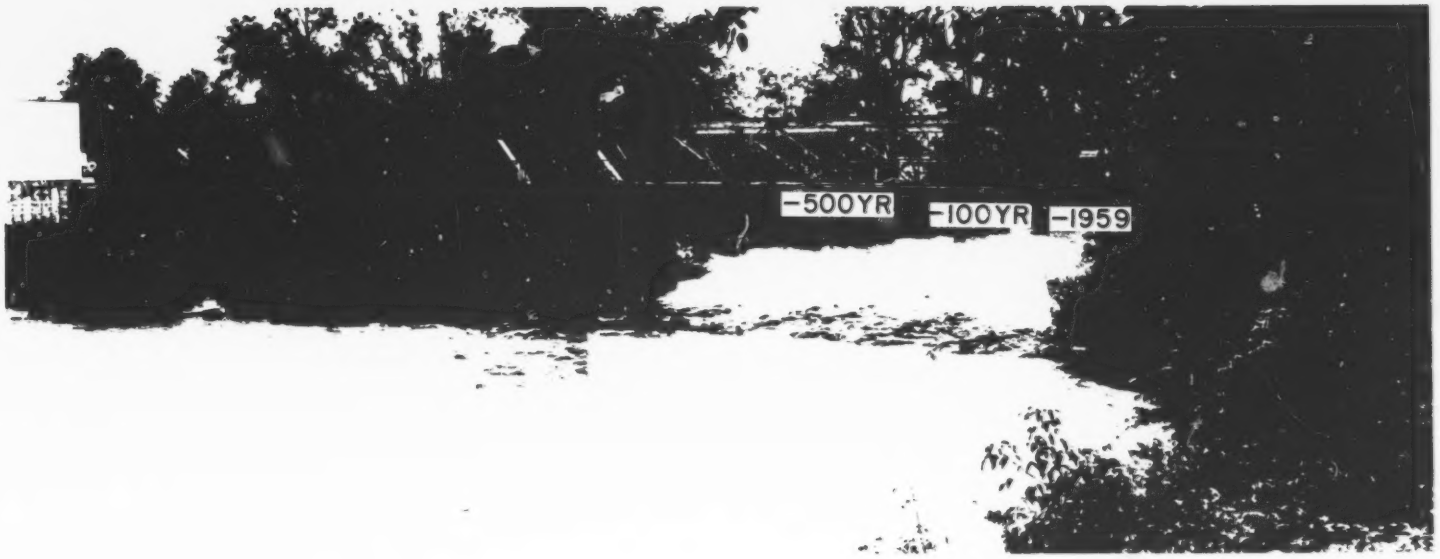


Figure 3. View of the upstream face of the Wayne Street bridge (State Route 218) over the Salamonie River. The 1959 flood level and the estimated 100-year and 500-year flood levels are indicated (photo date, June 1979).

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## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10, 50, 100, or 500 year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10, 50, 100, and 500 year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

By a Memorandum of Understanding of May 6, 1976, the U. S. Soil Conservation Service, The U. S. Geological Survey, the Corps of Engineers, and the Indiana Department of Natural Resources mutually agreed to coordinate discharge-frequency values for use in water resources investigation and planning activities in the State of Indiana. The Indiana Department of Natural Resources is the State Coordinating Agency for all of the Flood Insurance Studies which are performed in the State of Indiana and they have compiled and published the coordinated discharges of selected streams in Indiana. The discharge-frequency curves for the Salamonie River which have been used in this Study were obtained from this publication (Reference 9) by request of FEMA and the State Coordinating Agency.

A summary of drainage area-peak discharge relationships for each stream studied in detail is shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-YEAR | 50-YEAR | 100-YEAR | 500-YEAR |
|---|---|---|---|---|---|
| Salamonie River | | | | | |
| At USGS gage No. 03324300 | 425 | 10,900 | 14,800 | 16,000 | 18,300 |
| At 900 South Road | 415 | 10,700 | 14,500 | 15,900 | 18,200 |
| At upstream extraterritorial limits | 401.5 | 10,500 | 14,300 | 15,800 | 18,100 |

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the Town of Warren were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Cross sections for the backwater analyses of the Salamonie River were obtained from aerial photographs flown in April 1979, at a negative scale of 1:12,000 (Reference 10). The below-water sections were obtained by field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Channel roughness factors (Manning's "n") used in the hydraulic computations were based on field observations of the streams and flood plain areas using the procedures outlined in the Soil Conservation Service National Engineering Handbook (Reference 11). Roughness values for the main channel of the Salamonie River range from 0.030 to 0.065 with flood plain roughness values ranging from 0.038 to 0.090 for all floods.

Water surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program (Reference 12). The hydraulic model was adjusted using the highwater profile of the 1959 flood. Flood profiles were drawn to an accuracy of 0.5 foot showing computed water surface elevations for floods of the selected recurrence intervals. Starting water surface elevations for Salamonie River were derived

from gage station data. All elevations are referenced from the National Geodetic Vertical Datum of 1929, (NGVD) formerly referred to as Sea Level Datum of 1929; elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

## 4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

### 4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using photogrammetric equipment, aerial photographs and topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (References 10 and 13). In cases where the 100-and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

### 4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus

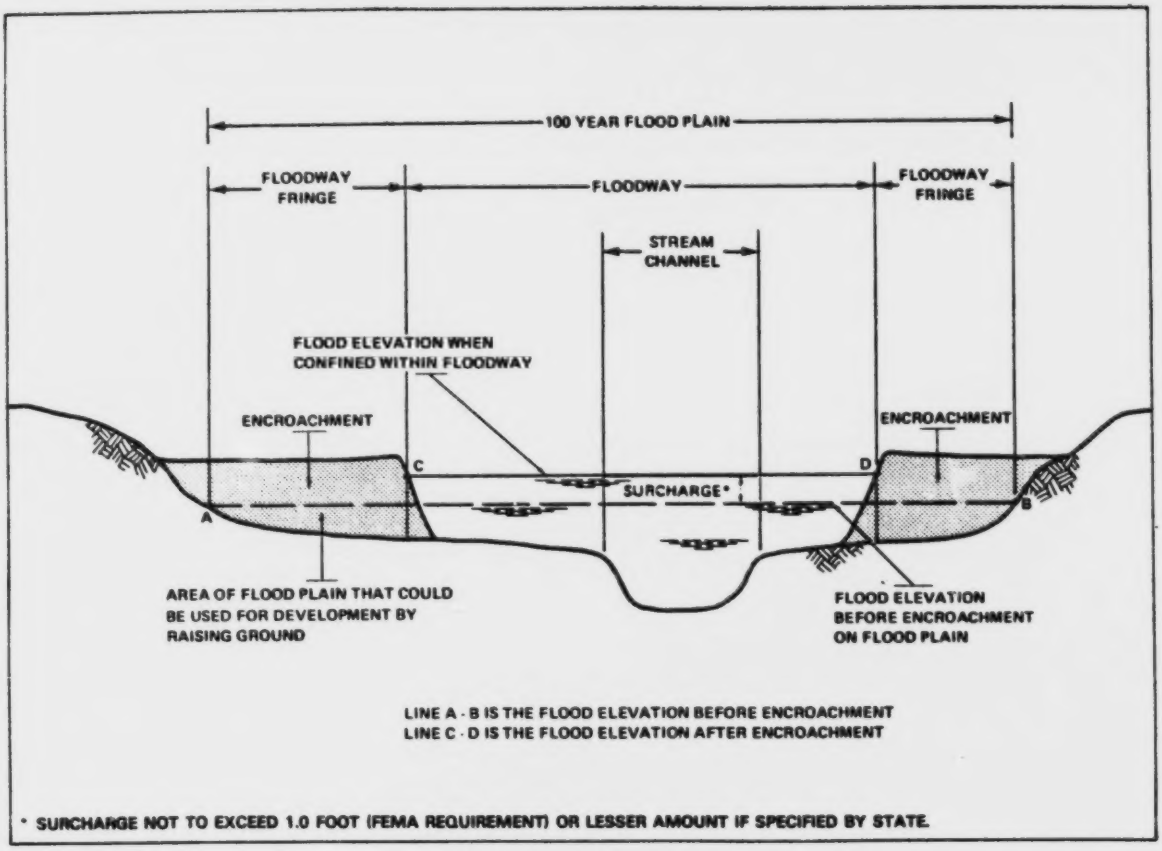
any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The State of Indiana, however, as set down by the Indiana Flood Control Act of 1945 and the Natural Resources Commission Policy Guidelines, Section 6, adopted March 29, 1974 (Reference 14), has designated that encroachment in the flood plain is limited to that which will cause no significant increase in flood height. As a result, no more than a 0.1-foot surcharge has been used to compute the floodway for this study. The floodways shown in this report were approved by the Indiana State Natural Resources Commission during the review process.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. A portion of the floodway of the Salamonie River lies outside of the extraterritorial limits.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
* SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

**FLOODWAY SCHEMATIC**

Figure 4

FLOODWAY SCHEMATIC

## 5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the Town of Warren.



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| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH[2] (FEET) | SECTION AREA (SQ FT.) | MEAN VELOCITY (FEET/SEC.) | REGULATORY (NGVD) | WITHOUT FLOODWAY (NGVD) | WITH FLOODWAY (NGVD) | INCREASE (FEET) |
| A[3] | -90 | 560/0 | 4,642 | 3.4 | 805.5 | 805.5 | 805.6 | 0.1 |
| B | 60 | 760/760 | 5,783 | 2.8 | 805.7 | 805.7 | 805.8 | 0.1 |
| C | 1,275 | 803/803 | 6,136 | 2.6 | 806.3 | 806.3 | 806.4 | 0.1 |
| D | 2,510 | 802/802 | 5,662 | 2.8 | 807.1 | 807.1 | 807.2 | 0.1 |
| E | 3,795 | 639/639 | 4,841 | 3.3 | 808.2 | 808.2 | 808.3 | 0.1 |
| F | 4,930 | 704/704 | 5,012 | 3.2 | 808.9 | 808.9 | 809.0 | 0.1 |
| G | 5,810 | 880/880 | 6,689 | 2.4 | 809.4 | 809.4 | 809.5 | 0.1 |
| H | 6,715 | 893/893 | 6,308 | 2.5 | 809.6 | 809.6 | 809.7 | 0.1 |
| I | 7,850 | 680/680 | 7,520 | 2.1 | 810.0 | 810.0 | 810.1 | 0.1 |
| J | 7,960 | 660/660 | 6,968 | 2.3 | 810.8 | 810.8 | 810.9 | 0.1 |
| K | 8,575 | 770/770 | 6,949 | 2.3 | 811.3 | 811.3 | 811.4 | 0.1 |
| L | 9,925 | 1,160/1,160 | 6,269 | 2.5 | 812.3 | 812.3 | 812.4 | 0.1 |
| M | 11,050 | 1,358/1,358 | 11,814 | 1.3 | 812.6 | 812.6 | 812.7 | 0.1 |
| N | 12,875 | 1,117/1,117 | 8,709 | 1.8 | 812.8 | 812.8 | 812.9 | 0.1 |
| O | 14,225 | 925/925 | 7,970 | 2.0 | 813.4 | 813.4 | 813.5 | 0.1 |
| P | 15,650 | 1,030/1,030 | 8,474 | 1.9 | 814.4 | 814.4 | 814.5 | 0.1 |
| Q | 16,575 | 990/520 | 6,412 | 2.5 | 814.6 | 814.6 | 814.7 | 0.1 |
| R[3] | 17,865 | 1,587/0 | 7,016 | 2.3 | 815.0 | 815.0 | 815.1 | 0.1 |

1) Feet Above 900 South Road
2) Total Width/Width Within Extraterritorial Limits
3) Cross Section A and R are Located Beyond the Extraterritorial Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WARREN, IN
(HUNTINGTON CO.)

FLOODWAY DATA

SALAMONIE RIVER

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## 5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

| Average Difference Between 10- and 100-Year Floods | Variation |
|---|---|
| Less than 2 feet | 0.5 foot |
| 2 to 7 feet | 1.0 foot |

One reach meeting the above criteria was required for the flooding source of the Town of Warren. The location of the reach is shown on the Flood Profiles.

## 5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

## 5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town of Warren was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

| | |
|---|---|
| Zone A: | Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined. |
| Zone A5: | Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones assigned according to FHFs. |

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND | | | FHF | ZONE | BASE FLOOD ELEVATION[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10 YR.) | 2% (50 YR.) | 0.2% (500 YR.) | | | |
| Salamonie River | | | | | | | |
| Reach 1 | 0001 | -2.4 | -0.6 | 1.0 | 025 | A5 | Varies-see map |

1) Flood Insurance Rate Map Panel
2) Weighted Average
3) Rounded To The Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WARREN, IN
(HUNTINGTON CO.)

FLOOD INSURANCE ZONE DATA

SALAMONIE RIVER

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Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or, areas subject to 100-year flooding from sources with drainage areas of less than one square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Warren is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FEMA.

## 6.0 OTHER STUDIES

A Flood Insurance Study is currently being conducted for the unincorporated areas of Huntington County (Reference 15). The results of this study are compatible with the Huntington Report.

A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 16). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

## 7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 S. Wacker Drive, 24th Floor, Chicago, Illinois 60606.

## 8.0 BIBLIOGRAPHY AND REFERENCES

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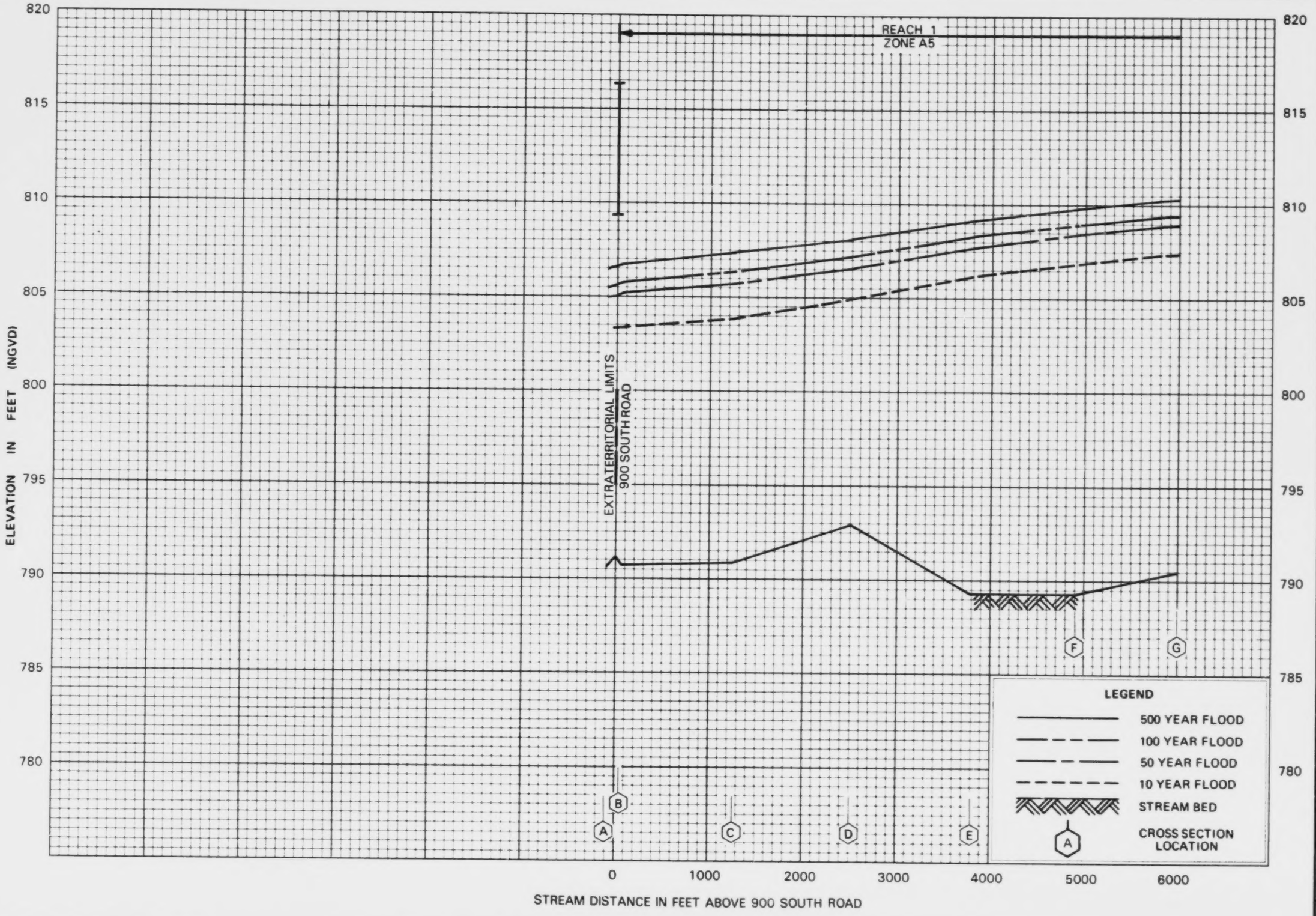


**FLOOD PROFILES**

**SALAMONIE RIVER**

federal emergency management agency

**TOWN OF WARREN, IN**

(HUNTINGTON CO.)

**01P**



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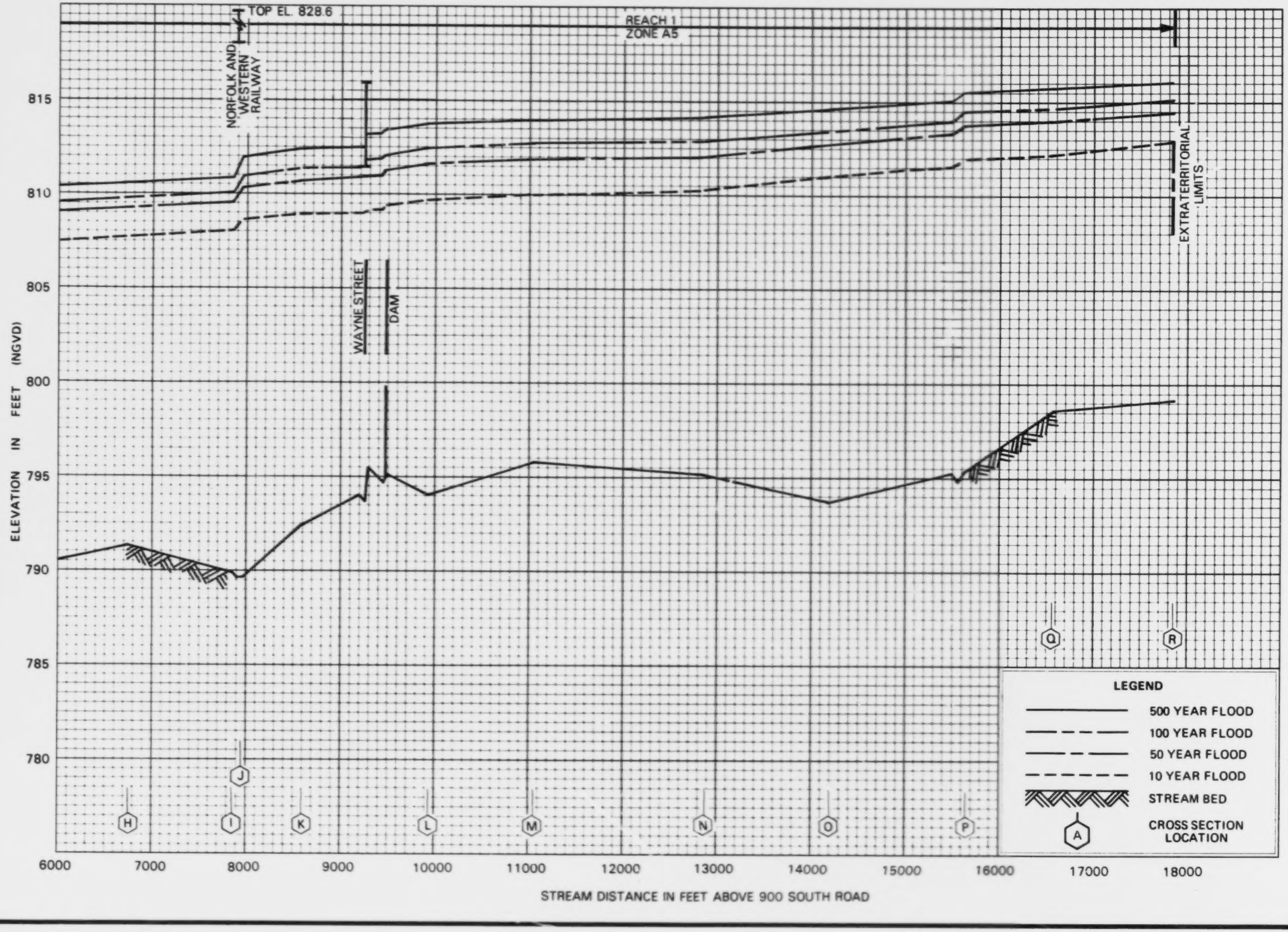


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